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ELLIPTIC ELEMENTS OF COMET *b*, 1898, AND A CERTAIN  
SIMILARITY TO THE COMETS OF 1684, AND 1785 I.

Using the following observations of this comet:—

1898.	Mt. Hamilton M. T.	App. $\alpha$	App. $\delta$
March 19,	16 <sup>h</sup> 47 <sup>m</sup> 21 <sup>s</sup>	21 <sup>h</sup> 18 <sup>m</sup> 36 <sup>s</sup> .89	+ 16° 43' 23".3
April 8,	16 19 7	22 41 0.88	+ 36 20 50 .5
April 28,	15 26 54	0 23 20.68	+ 49 41 32 .4

I obtained the following system of parabolic elements:—

$$\begin{aligned} T &= 1898 \text{ March } 17.35984 \text{ Gr. m. t.} \\ \omega &= 47^\circ 36' 8''.0 \\ \Omega &= 262 \quad 32 \quad 26 .3 \\ i &= 72 \quad 26 \quad 50 .4 \end{aligned} \left. \vphantom{\begin{aligned} T \\ \omega \\ \Omega \\ i \end{aligned}} \right\} \begin{array}{l} \text{Ecliptic and} \\ \text{Mean Equinox } 1898.0 \end{array}$$

$$\log q = 0.040820$$

The residuals from these elements for the middle place being—

$$\begin{array}{rcl} \text{Observed} - \text{Computed, } \Delta \lambda' \cos \beta' & & - 14''.7 \\ & \Delta \beta' & + 22 .4 \end{array}$$

From the same observations I then obtained the following system of elliptic elements:—

Epoch 1898, March, 20.0 Gr. m. t.

$$\begin{aligned} M &= 0^\circ 0' 34''.1 \\ \omega &= 47 \quad 14 \quad 48 .8 \\ \Omega &= 262 \quad 24 \quad 42 .9 \\ i &= 72 \quad 32 \quad 55 .8 \end{aligned} \left. \vphantom{\begin{aligned} M \\ \omega \\ \Omega \\ i \end{aligned}} \right\} 1898.0$$

$$\log q = 0.039179$$

$$a = 1.656386$$

$$e = 9.989386$$

$$\mu = 1.065428$$

$$\mu = 11''.62595$$

$$\phi 77^\circ 23' 3''.5$$

Period, 305.208 years.

The residuals for the three places used are:—

$$\begin{array}{rcl} \text{O} - \text{C.} & \alpha & \delta \\ & - 1''.2 & + 1''.1 \\ & - 0 .3 & - 1 .2 \\ & + 0 .5 & + 1 .1 \end{array}$$

The brightness of the comet remained almost unchanged for several weeks. The comet has been losing its light more rapidly the past ten days. It still retains its stellar nucleus; but this, too, is fading slowly, and is not brighter now than 10 magnitude.

Since ascertaining that this comet is periodic I have been led to notice more particularly a similarity which exists between its orbit and those of 1684 and 1785 I. Below are the approximate elements of the three comets for comparison:—

	$\omega$	$\Omega$	$i$	$q$
1684	330°.3	268°.2	65°.4	0.958
1785 I	205 .7	264 .2	70 .2	1.143
1898 <i>b</i>	47 .6	262 .5	72 .4	1.094

The agreement of the positions and dimensions ( $\Omega$ ,  $i$ , and  $q$ ) of the three orbits is sufficiently close to warrant the belief that the three comets belong at least to the same family. The differences in  $\omega$  are very large, too large to believe at first sight that the orbits all belong to the same comet—unless the discrepancies can be satisfactorily accounted for. It is to be noticed, however, that the variations in  $\omega$  are in the same direction. The intervals of 101 and 113 years do not agree well with the period found for the present comet, on an assumption that all three are appearances of the same object. The period of 305 years for the present comet must be considered uncertain to a large degree, however. All things considered, it looks more as if all three comets were members of one family than that they were appearances of the same body.

The comet of 1684 was discovered by BIANCHINI at Rome, and was visible to the naked eye. It was visible only a short time, the observations extending over the period July 1–17, only.

The comet of 1785 I was discovered by MESSIER at Paris. While it does not appear to have been so bright as the one of 1684, it was observed for some five weeks. C. D. PERRINE.

MT. HAMILTON, Cal., May 9, 1898.

#### COMETARY DISCOVERIES.

The total number of comets observed sufficiently well during the last thirty years (1868–1897) for their orbits to be calculated amounts to one hundred and thirty-five, but of these thirty-seven were returns of periodic comets which had been previously seen.

The average rate of apparition of new comets has, therefore, been 3.27 annually, and of new and periodic comets, 4.5 annually. In 1873, 1881, 1892, and 1896, seven comets were discovered; in 1872 not one was observed; and in 1875 the only two comets which appeared were known ones. The best months for the discovery of these objects appear to be July and August.